

NATURAL RESOURCES CONSERVATION SERVICE
PACIFIC BASIN AREA
CONSERVATION PRACTICE STANDARD

SURFACE DRAINAGE, FIELD DITCH

(Meters, Feet)
CODE 607

DEFINITION

A graded ditch for collecting excess water in a field.

PURPOSE

This standard applies to drainage ditches installed to:

- Collect or intercept excess surface water, such as sheet flow, from natural and graded land surfaces or channel flow from furrows and carry it to an outlet; and,
- Collect or intercept excess subsurface water and carry it to an outlet.

It does not apply to the Pacific Basin standards: Surface Drainage, Main or Lateral (608), to Diversion (362), Hillside Ditch (423) or to Grassed Waterway (412).

CONDITIONS WHERE PRACTICE APPLIES

Applicable sites are flat or nearly flat and:

1. Have soils that are slowly permeable (low permeability) or that are shallow over barriers, such as rock or clay, which hold or prevent ready percolation of water to a deep stratum.
2. Have surface depressions or barriers that trap rainfall.
3. Have insufficient landslope for ready movement of runoff across the surface.
4. Receive excess seepage from uplands.
5. Require the removal of excess irrigation water.
6. Require control of the water table.
7. Have adequate outlets available for disposal of drainage water by gravity flow or pumping.

DESIGN CRITERIA

Drainage field ditches shall be planned as integral parts of a drainage system for the field served and shall collect and intercept

water and carry it to an outlet with continuity and without ponding.

Investigations. An adequate investigation of the site shall be made and shall determine the presence and significance of potential wetlands, the nature of the soil at the site, the predominant cropping pattern, and the severity and frequency of flooding.

Location. Ditches shall be established, insofar as topography and property boundaries permit, in straight or nearly straight courses. Random alignment may be used to follow depressions and isolated wet areas of irregular or undulating topography. Excessive cuts and the creation of small irregular fields shall be avoided.

On extensive areas of uniform topography, collection or interception ditches shall be installed as required for effective drainage.

Design. The size, depth, side slopes, and cross sectional area shall:

1. Be adequate to provide the required drainage for the site. The required minimum capacity of the ditch and associated drainage system shall be 0.0084 M³ /sec for each Hectare of drainage area (0. 12 ft³ /sec for each acre of drainage area). When the minimum constructible channel is larger than what is needed for the minimum required capacity, the minimum constructible size shall govern.
2. Computations showing required capacity and designed capacity will be included in the design documentation.
3. Permit free entry of water from adjacent land surfaces without causing excessive erosion.
4. Provide effective disposal or reuse of excess irrigation water (if applicable).

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5. Conduct flow without causing erosion. Flow computations for vegetated drainage channels shall be based on Engineering Field Handbook Chapter 7 velocity retardance curves. The maximum velocity for the vegetated channels shall be 1.5 M/sec (4.9 ft/sec).
6. Provide stable side slopes base on soil characteristics. Maximum side slopes for non-cohesive soils shall be 2 horizontal to each vertical (2:1). Maintenance with equipment can only be achieved with 3 horizontal to each vertical side slope (3:1). Spoil placement close to the edge of steep excavated slopes in saturated soils can cause slope failure due to the surcharge (additional weight to be supported by the banks). Care should be used in the disposal of excavated materials to avoid the problem.
7. Permit crossing by field equipment, or address field access when planning the location of the ditches.
8. Permit construction and maintenance with available equipment.

CONSIDERATIONS

Water quantity impacts, particularly the relationships between runoff and infiltration, and the possibility of reducing groundwater recharge shall be considered in the planning stages. The effects of the lowered water table and the rooting depth of adjacent vegetation (crops and others), should be considered.

The offsite consequences of the drainage including increase of sediment load, nutrients attached to the sediments, increased turbidity of receiving waters, potential changes in the downstream water temperature, and effects on downstream wetlands will be addressed in the planning stages.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing the ditches shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve the intended purpose.

Preliminary to developing design and construction plans, appropriate survey must

be obtained. Such data will include sufficient points show ditch alignment, profiles, cross sections, locate physical features (roads, trees, rocks, etc.), structural details required (culverts, etc.), and location of spoil areas that will affect construction. All surveys will be in accordance with Chapter 1 of the EFH Chapter 1 and Technical Reference 62.

Watercourses and water quality shall be protected during and after construction by erosion control details which might include the associated Pacific Basin standards: Filter Strips (393), Critical Area Planting (342), Mulching 484), or Water and Sediment Control Basin (638). Additionally the use of silt fences, or staged construction may be required.

Construction plans shall include a plan view drawn to scale, a typical channel section, a profile of the centerline of the channel, and spoil disposal requirements as a minimum. If additional conservation practices are included in the project for water management and water quality concerns, the information necessary to construct those practices will also be conveyed on the plans. Development of construction plans will be guided by Engineering Field Handbook Chapter 5.

Construction specifications will need to address the removal of trees, stumps and large rocks where the site investigation has revealed their presence. The disposal of undesirable material will be either specified or shown on the construction drawings. Incidental information necessary to construct the job will need to be either communicated in the construction specifications or carried on the construction drawings in the form of construction notes.

As-Built Plans. As-Built plans shall reflect all significant changes in alignment, cross section, structure location, etc.. It is expected that all changes will be with the prior consent of the individual approving the design. If there were no changes, the original drawings shall be marked, "AsBuilt."

OPERATION AND MAINTENANCE

Operation instructions should outline the probable frequency of flow of the channel,

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and the fact that it is not designed to carry stormwater discharge from the watershed.

Maintenance requirements that shall be communicated in writing to the cooperator are the nature, timing and expected frequency of activities. They will include the need for mowing of vegetation to maintain capacity, removal of sediment, and the fertilization of vegetation to maintain protection against erosion. Maintenance requirements for conservation practices constructed in conjunction with the ditch shall also be communicated in writing. Guidelines for repair of features damaged by heavy rainfall or other less frequent events should be included, as well as instructions to contact the SWCD/NRCS office if unanticipated problems arise.